VIRGINIA DEPARTMENT OF HEALTH
Protecting You and Your Environment

**Protocols for Hospital Newborn Hearing Screening**
**Virginia Early Hearing Detection and Intervention Program**
**Virginia Department of Health**

This document provides guidance and recommended procedures for how best to implement hospital requirements that are specified in the *Code of Virginia*, Section 32.1-46 [1] and *Regulations for the Administration of the Virginia Hearing Impairment Identification and Monitoring System*[2].

These protocols represent the best practice that the Virginia Early Hearing Detection and Intervention Program (VEHDIP) Advisory Committee recommends based on the policy statement *Year 2007 Position Statement: Principles and Guidelines for Early Hearing Detection and Intervention Programs, Joint Committee on Infant Hearing* and other relevant sources such as the Centers for Disease Control and Prevention (CDC), and the National Center on Birth Defects and Developmental Disabilities. The VEHDIP Advisory Committee consists of representatives from relevant groups including, but not limited to, physicians, otolaryngologists, audiologists, speech pathologists, nurses, and parents.

It is important to recognize that newborn hearing screening is only one component of a comprehensive approach to the management of childhood hearing loss. The process also requires follow-up diagnostic services, counseling, intervention programs, and parental education. This comprehensive process should be administered by a multidisciplinary team, including but not limited to, audiologists, physicians, educators, speech/language pathologists, nurses, and parents.

VEHDIP goals are to identify congenital hearing loss by 3 months of age following the Centers for Disease Control and Prevention *1-3-6 methodology*:

1 – All newborns will be screened for hearing loss **before 1 month** of age.

3 – All newborns who have failed their hearing screen will receive a diagnostic evaluation **before 3 months** of age.

6 – All infants diagnosed with hearing loss will be enrolled in early intervention services **before 6 months** of age.

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[1] To access the *Code of Virginia* citation, go to: http://leg1.state.va.us/cgi-bin/legp504.exe?000+cod+32.1-64.1
[2] To access the *Regulations for the Administration of the Virginia Hearing Impairment Identification and Monitoring System,* go to http://leg1.state.va.us/000/reg/TOC12005.HTM#C0080

## I. Hospital Responsibilities

1. Hospitals should designate a hospital employee to be responsible for the newborn hearing screening program in that facility. This individual should act as the primary point of contact between the facility and VEHDIP. A secondary-designee is recommended.
2. Hospitals should develop methods for collecting and recording all required data that assure data quality. Additionally, hospitals should ensure strict quality control standards for adhering to reporting requirements, especially in those hospitals where staff who perform the screening and/or record risk indicators are different from staff who enter and record the data. Information regarding screening status/results and risk indicators should be a permanent part of the patient's medical record.
3. Hearing screening equipment should be calibrated annually and documentation maintained at the hospital. The target for newborn hearing screen referral rates is *less than 4% for infants in a regular nursery* and *no greater than 10% for infants in neonatal intensive care services*.
4. Training and quality assurance measures are vital components for the efficiency and overall effectiveness of screening programs. Hospitals should ensure that all screening personnel are appropriately trained to carry out the newborn hearing screen using appropriate technology.
5. Hospitals:
   - Must provide written information to the parent that includes purposes and benefits of newborn hearing screening, the procedures used for screening, recommendations for further testing, and where testing can be obtained (per Regulation), and this information should include indicators of hearing loss.
   - Must inform the parent of the results of their child's newborn hearing screen, in writing and prior to discharge (per Regulation).
   - Must provide written screening results and recommendations to the Primary Healthcare Provider (PHP) from whom the infant will receive care after discharge (per Regulation), and this information should be provided within two weeks from discharge.

   The importance of medical, audiological, and developmental follow-up, the importance of contacting their child's PHP with any developmental concern, and the benefits of the early identification of hearing loss should be communicated to all parents.
6. Hospitals must report hearing screening results to the Virginia Department of Health (VDH), and these results must be reported to VDH via the Virginia Infant Screening and Infant Tracking System (VISITS) database within two weeks of discharge (per Regulation).
7. On January 1st of each year, hospitals should report the following information to VDH (template available):
   - Test procedures used by the facility's newborn hearing screening program.
   - Name, telephone number, and e-mail address of program director.
   - Name of advising audiologist.
   - Screening equipment utilized, including date/record of calibration, screening protocols, and referral criteria.

## II. In-Patient Screening

All infants must be given a hearing screen prior to hospital discharge (per Regulation). The hospital discharging the infant to home should screen the infant's hearing. Even if the infant was screened and passed at a previous facility, the discharge hospital should perform a hearing screen, as the infant's health status may have changed.

A variety of technologies are available to identify hearing loss in the first days of life. The two methodologies generally accepted as effective for universal newborn screening are:

1) **Auditory brainstem response (ABR)** – reflects the activity of the cochlea, auditory nerve, and auditory brainstem pathways.

2) **Otoacoustic emissions (OAE)** – reflects sensitivity to outer hair cell dysfunction.

These techniques are physiological measures of the status of the peripheral auditory system that are highly correlated with hearing status. The techniques permit the identification of infants with communicatively significant hearing impairment without referring large numbers of normal-hearing infants for unnecessary follow-up testing.

Infants who fail hearing screening in one or both ears using ABR testing should not be re-screened using OAE testing.

Due to the increased incidence of auditory neuropathy in the neonatal intensive care unit (NICU) patient population, newborns who receive this level of care for more than five days should have both ears screened using ABR testing prior to discharge or transfer to a lower level of newborn services.

Infants receiving antibiotic therapy should have a hearing screening performed prior to discharge, and it is acceptable to screen the infant while receiving antibiotics. Hospital discharge should not be delayed pending hearing screening off of antibiotic therapy. Likewise, antibiotic therapy should not be a reason for a "missed" screen.

VDH recognizes that newborn hearing screens could be performed by both medical and non-medical personnel. Studies have documented that the screen can be carried out effectively by a wide variety of personnel with appropriate training. Recognizing the diversity in personnel, VDH recommends the use of automated instrumentation that provides a pass/fail outcome as the initial hearing screening device for hospitals.

A licensed audiologist with appropriate training and experience should advise the hospital about all aspects of the newborn screening program, including screening, tracking, follow-up, and referral. For hospitals that do not have access to audiological personnel, VDH can provide the names of audiologists with experience in newborn hearing screening. The list of approved audiologists can be obtained from the VEHDIP website www.vahealth.org/hearing.

An infant who **fails** the initial hearing screen should be referred for audiological follow-up at a center approved by VDH. A list of VDH-approved Diagnostic Audiology Providers can be

accessed and printed from the VISITS database (under *Referral Centers* on the menu). Prior to discharge, the hospital should give written information to the parent as to where this hearing test can be obtained within one month of hospital discharge. A completed diagnostic evaluation should be done by 3 months of age.

Infants with incomplete screening results (due to uncooperative infant, debris in ear canal, or excess myogenic activity) should be considered as a **fail**.

For infants who are missed (i.e., not screened), it is the responsibility of the hospital to inform the parent, prior to discharge, of the need for the hearing screen and to provide a mechanism by which that screening can occur at no additional cost to the family (per Regulation). This screening should occur within one month of hospital discharge.

The VDH brochure *Can Your Baby Hear?* was developed to inform parents about newborn hearing screening and medical, audiological, and developmental follow-up. It is recommended that hospitals give this brochure to the parent. Brochures are available in English and Spanish, are free of charge, and can be ordered by calling (804) 864-7697. The brochure can be printed from the VEHDIP website www.vahealth.org/hearing.

## III. Out-Patient Screening

Hospitals that bring infants back for the initial screen (if **missed**) or for a re-screen (if **failed**) must report the results to VDH via the VISITS database (per Regulation). Within two weeks of discharge, the infant's data should be entered initially in the database as "missed" or "failed." Subsequently, results of the outpatient screen should be entered as such within two weeks of screening. For re-screening, testing of both ears is necessary, even if only one ear failed the initial screening.

Screening methodologies are the same as described under Inpatient Screening.

## IV. Testing Parameters

When non-automated screening devices are utilized, the following protocols are recommended:

**Auditory Brainstem Response (ABR)**
Stimulus: air conduction click stimulus for both ears
Pass Criteria: replicable wave V response thresholds ≤ 25-30 dBnHL

**Transient evoked Otoacoustic emissions (TEOAE)**
Stimulus: air conduction click
Intensity: 80 +/- 3 dB SPL
Pass Criteria:

- Frequencies 2000 Hz through 5000 Hz
- Three of four frequencies having reproducibility minimally: 70% @ 2400, 3200, 4000, and 5000 Hz

**Distortion Product Otoacoustic Emissions (DPOAE)**
Stimulus: pure tone complex
Intensity: maximum levels <70 dB SPL
Pass Criteria:

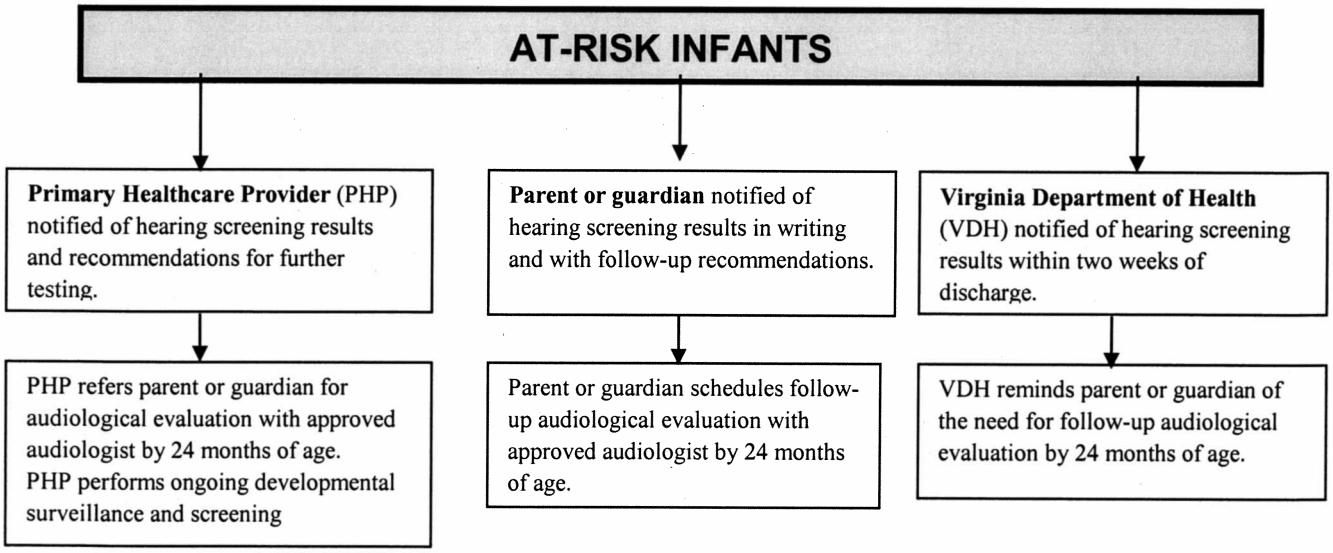
- F2 = 2000, 3000, 4000, and 5000 Hz
- Three of four frequencies have a distortion product (2F1-F2) amplitude ≥ 6 dB than measured noise floor levels

## V. Risk Indicators

The *Code of Virginia* requires that hospitals determine the risk status for hearing loss on every newborn regardless of the results of the hearing screen. Risk-status data assist with monitoring for progressive, delayed-onset, and/or conductive hearing loss. VEHDIP uses the risk indicators identified by the *Year 2007 Position Statement: Principles and Guidelines for Early Hearing Detection and Intervention Programs, Joint Committee on Infant Hearing* (See Table I).

Some indicators may not be determined during the course of the hospital stay. Therefore, infants and young children who have late-onset or late-indentified risk indicators should be monitored for speech, language, and hearing development milestones by the PHP during well-child visits.

The following diagram summarizes processes that should be followed to ensure infants and children who are at risk for hearing loss receive appropriate audiological follow-up.




VDH recommends that a medical professional obtain the risk information from the infant's and mother's charts; family history of permanent childhood hearing loss should be identified by a direct question to the parent(s). The parent should not simply be given the whole list of indicators to check off, as they may not know about or understand the meaning of all indicators. The medical professional should review the risk information with the parent.

Some indicators are not present and/or would not be identified in the newborn period. These include parental concern and some neurodegenerative disorders or sensory motor neuropathies.

These are included in the risk indicator list because parents and physicians should be informed about all indicators that can contribute to development of hearing loss beyond the newborn period.

Infants who pass the screen but have an identified risk indicator for progressive or delayed-onset hearing loss (**pass with risk**) should have a complete diagnostic evaluation by 24 months of age.

## VI. Reporting

Reporting should be done through the VISITS database as managed by VDH. Reporting for inpatient screens completed by the hospital should be reported within two weeks of discharge. Reporting for outpatient screens completed by the hospital should be reported within two weeks of screening.

Hospitals should report the screen or re-screen that is performed at their facility only. Do not enter results from tests done by other facilities.

For the reporting system to function optimally, use of Internet Explorer 6.0 or higher is required when using the VISITS database.

Reporting accuracy is crucial to families and to the program. A risk indicator identified incorrectly will cause unnecessary worry for parents as well as unnecessary time and expense spent in obtaining follow-up testing.

## VII. Contacts

For more information or further assistance, families are encouraged to contact:

**Virginia Department of Health**
**Office of Family Health Services**
**Virginia Early Hearing Detection and Intervention Program**
**109 Governor Street, 8th Floor**
**Richmond, Virginia 23219**
**Phone: Toll Free 1-866-493-1090 TTY 7-1-1**
**Fax: 804-864-7721**
**Website: www.vahealth.org/hearing**

For VISITS user support please call (804) 864-7200 between 8:00 am – 5:00 pm.

**Table I. Risk Indicators for Progressive or Delayed-Onset Hearing Loss**
(For Use with Neonates and Infants Through 2 Years of Age)

| | | |
|---|---|---|
| **Family history of permanent childhood hearing loss** | | |
| • Mother of child | • Grandmother of child | • 1st cousin of child |
| • Father of child | • Grandfather of child | • More than one relative of the same parent |
| • Sister of child | • Aunt of child | |
| • Brother of child | • Uncle of child | |
| | | |
| **Stigmata or other findings associated with a syndrome known to include a sensorineural or conductive hearing loss or Eustachian tube dysfunction** | | |
| • Branchio-oto-renal (BOR) | • Stickler | • Trisomy 21 – Down syndrome |
| • Noonan | • Williams | • Trisomy 18 – Edwards syndrome |
| • CHARGE association | • Zellweger | • Trisomy 13 – Patau syndrome |
| • Pierre Robin | • Goldenhar (oculo-auriculo-vertebral or OAV) | • Trisomy 9 – Mosaic syndrome |
| • Rubenstein-Taybi | • Trisomy 8 – Warkany syndrome | |
| | | |
| **Postnatal infections associated with sensorineural hearing loss** | | |
| • Confirmed bacterial meningitis | • Confirmed viral meningitis | |
| **In utero infections** | | |
| • Cytomegalovirus | • Rubella | • Toxoplasmosis |
| • Herpes | • Syphilis | |
| | | |
| **Neonatal indicators** | | |
| • Intensive care greater than (>) 5 days | • Exposure to ototoxic medications: at risk aminoglycoside exposure | • Hyperbilirubinemia requiring exchange transfusion |
| • Extracorporeal membrane oxygenation (ECMO) | • Mechanical ventilation | |
| | | |
| **Syndromes associated with progressive hearing loss** | | |
| • Neurofibromatosis | • Jervell & Lange-Nielson | • Usher |
| • Osteopetrosis | • Waardenburg | |
| • Alport | • Pendred | |
| | | |
| **Neurodegenerative disorders, such as** | | |
| • Hunter syndrome | • Charcot-Marie-Tooth syndrome | • Friedreich's ataxia |
| | | |
| **Head trauma requiring hospitalization** | | |
| • Basal skull/temporal bone fracture | Other – specify if chosen | |
| | | |
| **Parental or caregiver concern regarding hearing, speech, language, and or developmental delay** | | |
| | | |
| **Craniofacial Anomalies** | | |
| • Pinna | • Atresia | • Choanal atresia |
| • Cleft palate | • Microtia | • Temporal bone anomalies |
| **Chemotherapy** | | |

Based on *Year 2007 Position Statement: Principles and Guidelines for Early Hearing Detection and Intervention Programs, Joint Committee on Infant Hearing.*

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Date